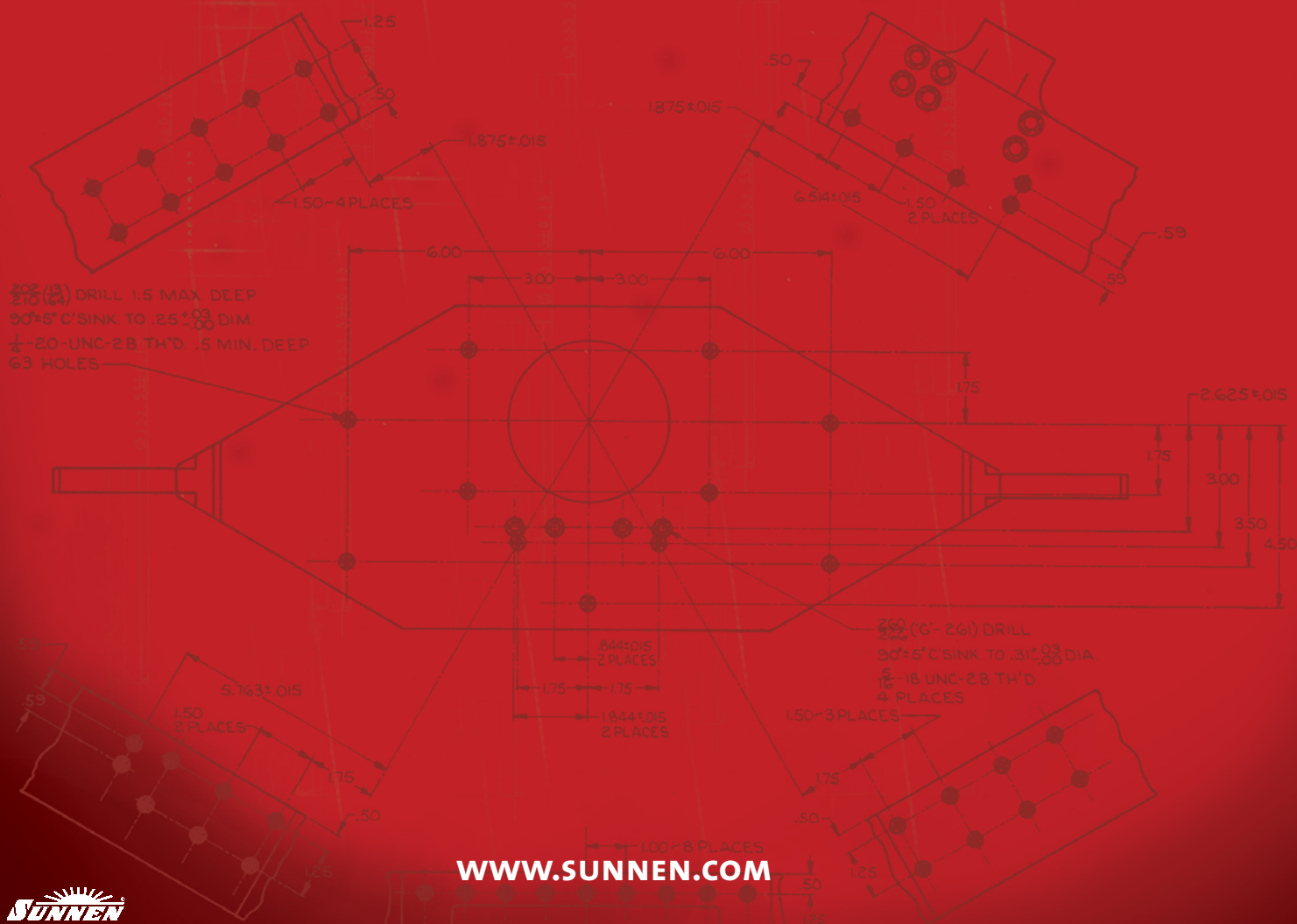


SUNNEN[®] HONING TECHNIQUES

DATA FILE: #113

FIXTURING DESIGN CONSIDERATIONS

FOR AUTOMATIC KROSSGRINDING[®] MACHINES



WORKPIECE FIXTURING CATEGORIES

Most workpieces that you would hone on a Sunnen Automatic KrossGrinding[®] Machine fall into 7 categories as far as fixturing is concerned They are:

1. Workpieces which have a round outer surface and a substantial wall thickness.
2. Workpieces with thin walls.
3. Workpieces with projections on the outer surface.
4. Workpieces with a hole on the outer surface.
5. Workpieces with irregular outer surface.
6. Workpieces with short bores which must be held square to the face.
7. Short workpieces.

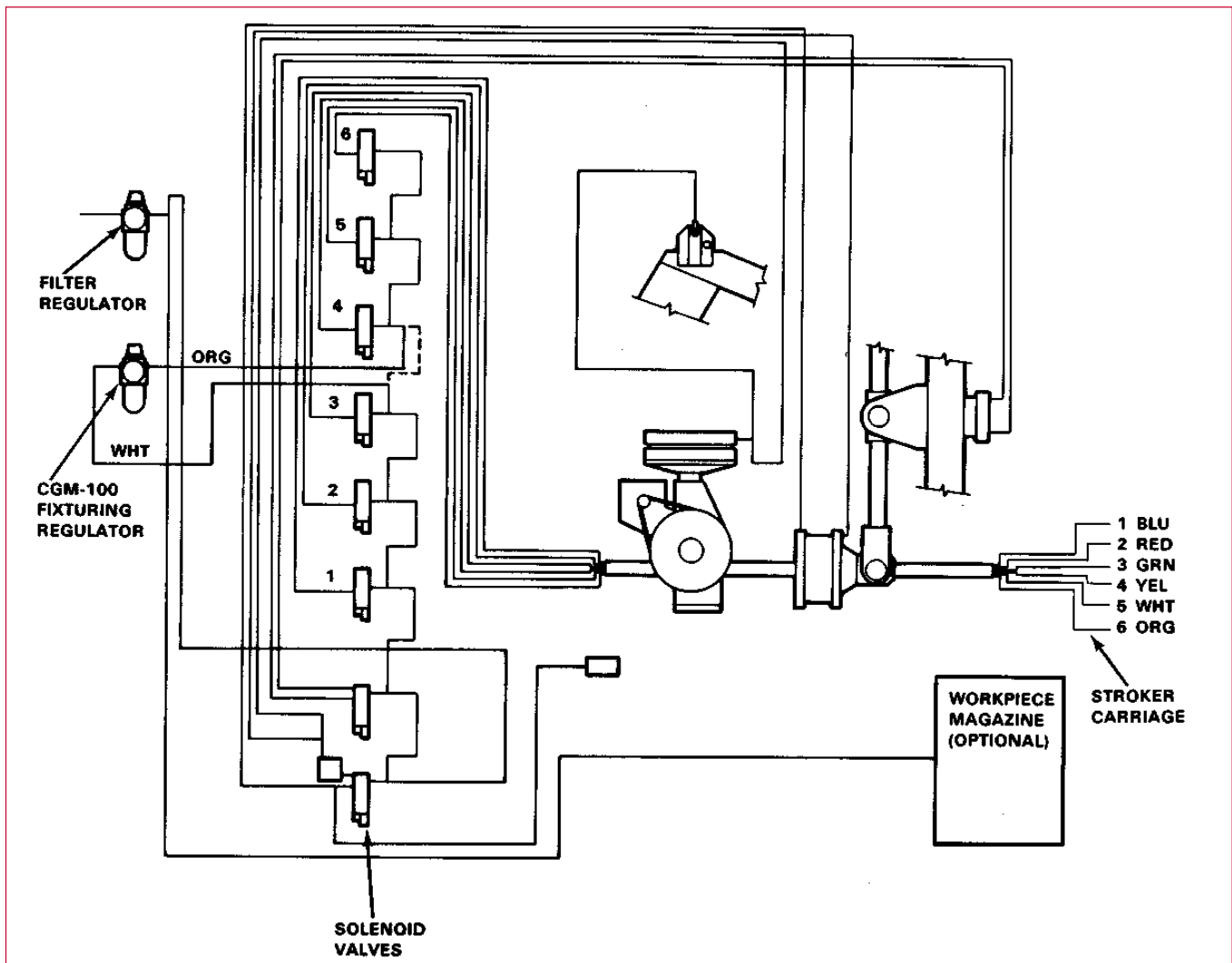


Figure 1, Pneumatic Diagram

GUIDELINES FOR FIXTURING DESIGN

GENERAL

These Instructions provide general guidelines to be used when designing a workpiece holding fixture for use on Sunnen CGM-5000 Automatic CrossGrinding® Machine.

PRIMARY DESIGN CONSIDERATIONS

1. Fixture Mounting
2. Pneumatic Lines for Fixturing
3. Fixture Weight

FIXTURE MOUNTING

For Fixture Mounting Requirements *refer to Figures A on page 5*. For optional Fixturing Accessories *refer to Parts List on page 6*.

To install, proceed as follows:

The Stroker Carriage has several surfaces and hole patterns for fixture mounting. The Stroker Carriage was carefully adjusted on assemble to assure that its main face is perpendicular to the spindle centerline within .0003" per inch. The Carriage also has six side surfaces which have been machined perpendicular to the main face within .0003" T.I.R. Each of these surfaces have hole patterns for fixture mounting.

CAUTION

DO NOT attempt to remove the Stroker Carriage for machining. The perpendicularity to the spindle will be lost and readjustment is difficult without special tools.

If additional holes are required, they should be machined into an intermediate platen .250 to .375 in. thick (6,4 - 9,5mm) and the platen attached to the Stroker Carriage at existing hole locations.

If the bore of workpiece is to be honed perpendicular to a face with a tolerance that is less than .0003" per inch, then the locating face of the fixture should be indicated and, if necessary, shimmed or adjusted to less than the perpendicularity tolerance of the workpiece.

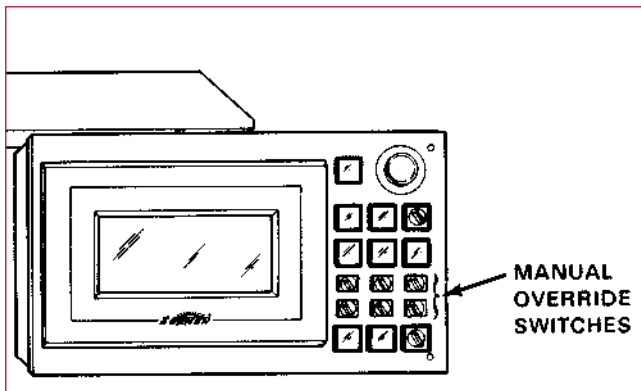


Figure 2, Manual Override Switches

PNEUMATIC LINES FOR FIXTURING

For pneumatic requirements *refer to Figure 1* and proceed as follows:

On the top rear surface of the Stroker Carriage are six Ports for attaching the pneumatic lines for fixturing. These are controlled by six independent Solenoid Valves, with the switching sequence programmable through the Touch Screen on the Operator Control Panel, when the Machine is in the Setup Mode.

NOTE: On the Operator Control Panel there are six manual override switches for fixture setup or manual operation (*see Figure 2*).

The six Ports on the Stroker Carriage are color-coded & numbered Quick-Release Fittings (push to release) for 5/32 in. OD nylon tubing. These color-coded & numbered Fittings correspond to six color-coded & numbered Switches on the Operator Control Panel. For ease of setup, it is recommended that 5/32" OD colored nylon Tubing be used to match the corresponding Ports and that the Tubing be left attached to the Fixture when the Fixture is removed from the Machine. This will enable the operator to quickly reconnect the Fixture to the appropriate Ports.

Furthermore, the Ports switching sequence is saved in the Machine Memory with the other setup parameters for each job (up to 100 setups can be held in the Machine Memory). Once the Fixture is reconnected the operator calls up that particular job and is ready to start production.

NOTE: Approximately 3 ft. (0,9 m) of each color-coded Tubing is provided with the Sunnen Automatic CrossGrinding Machine (CGM-5000). Additional Tubing and a variety of Quick-Release Fittings are available from Sunnen Products Company (*refer to Parts List on page 6*).

The Sunnen Automatic CrossGrinding Machine is shipped with Plugs in the Ports. Any Port that is not in use should remain plugged to keep out Honing Fluids and dirt.

CAUTION

Before removing a Plug or color-coded Tubing from a Port, turn the corresponding Manual Override Switch on the Operator Control Panel to OFF.

The air provided to the Ports by the Machine Pneumatic System is 80 psi (5.5 Bar). If a lower pressure is required at any or all the Ports an additional regulator will need to be installed; order Sunnen CGM-100 Fixturing Regulator (*refer to Parts List on page 6*).

CAUTION

DO NOT simply turn down the Machine's main Filter Regulator. The 80 psi (5.5 Bar) is required for other vital Machine functions.

The Sunnen CGM-100 Fixturing Regulator can be installed inside the Machine next to the main Filter Regulator. In this area there are also solenoid valves. The solenoid valves for the fixture lines are on top of the valves stack and are numbered according to the port they control. To install the Regulator, remove one of the short Orange Lines that run between the solenoid valves and connect the white line from the Regulator to the lower valve and the orange line from the Regulator to the upper valve. Which line to remove will depend on how many ports are needed at the lower pressure. (i.e. If the orange line is removed between valves #3 and #4, then ports 1 through 3 with still have normal pressure and ports 4 through 6 will have the lower pressure. If all six ports require the lower pressure, remove the orange line between valves "B" and #1.)

NOTE: The Solenoid Valves may not operate at very low pressures - 45 psi (3,1 Bar) or below. In cases requiring very low pressures, try using smaller fixturing actuators so higher pressures can be used. If this is not possible, contact Sunnen Products Company, St. Louis, MO. for further assistance.

FIXTURE WEIGHT

During the KrossGrinding Process, the workpiece is stroked at a fairly high rate. These high stroke speeds generate stroking forces which can shorten the life of Stroker Assembly components and which can cause vibration that is potentially detrimental to the finished bore geometry. Therefore, the fixture designer should try to minimize the combined weight of the workpiece and any fixturing that is attached to the Stroker Carriage.

TABLE 1, Stroke Speeds

COMBINED WEIGHT OF WORKPIECE & FIXTURE POUNDS KILOGRAMS		"MAXIMUM SAFE" STROKE SPEED
0 to 5	0,0 to 2,3	Safe up to the maximum allowed by the Machine.
5 to 10	2,3 to 4,5	Safe up to the recommended Stroke Speed (displayed on the Machine's Operator Control Panel) DO NOT edit Stroke Speed to a higher value.
over 10	over 4,5	DO NOT operate at recommended Stroke Speed. Decrease the recommended Stroke Speed by 3% for every lb. over 10 lbs. (6.7% for every kg over 4,5 kg).

When programming in the setup parameters on your Machine, the Operator Control Panel will display the recommended Stroke Speed. The actual optimum stroke speed will vary depending on the particular application. In general, it is possible to edit this stroke speed to a higher or lower value to optimize the cycle time and/or bore geometry. If the fixture and workpiece are too heavy, the higher speeds cannot be tied safely. Therefore, to provide maximum flexibility in choosing stroke speeds, the combined workpiece and fixture weight should be kept to a minimum.

The Sunnen CGM-5000 Automatic KrossGrinding Machine assumes a fixture and workpiece weight of approximately 5 lbs. (2,3 kg) and it allows stroke speed to be edited up to the maximum safe speed for that weight. If the weight is greater than 5 lbs. (2,3 kg), the guidelines shown in the following Table should be used to determine the maximum safe speed (*see Table 1*).

CAUTION

DO NOT exceed the recommended "Maximum Safe" Stroke Speed called out in the following Table.

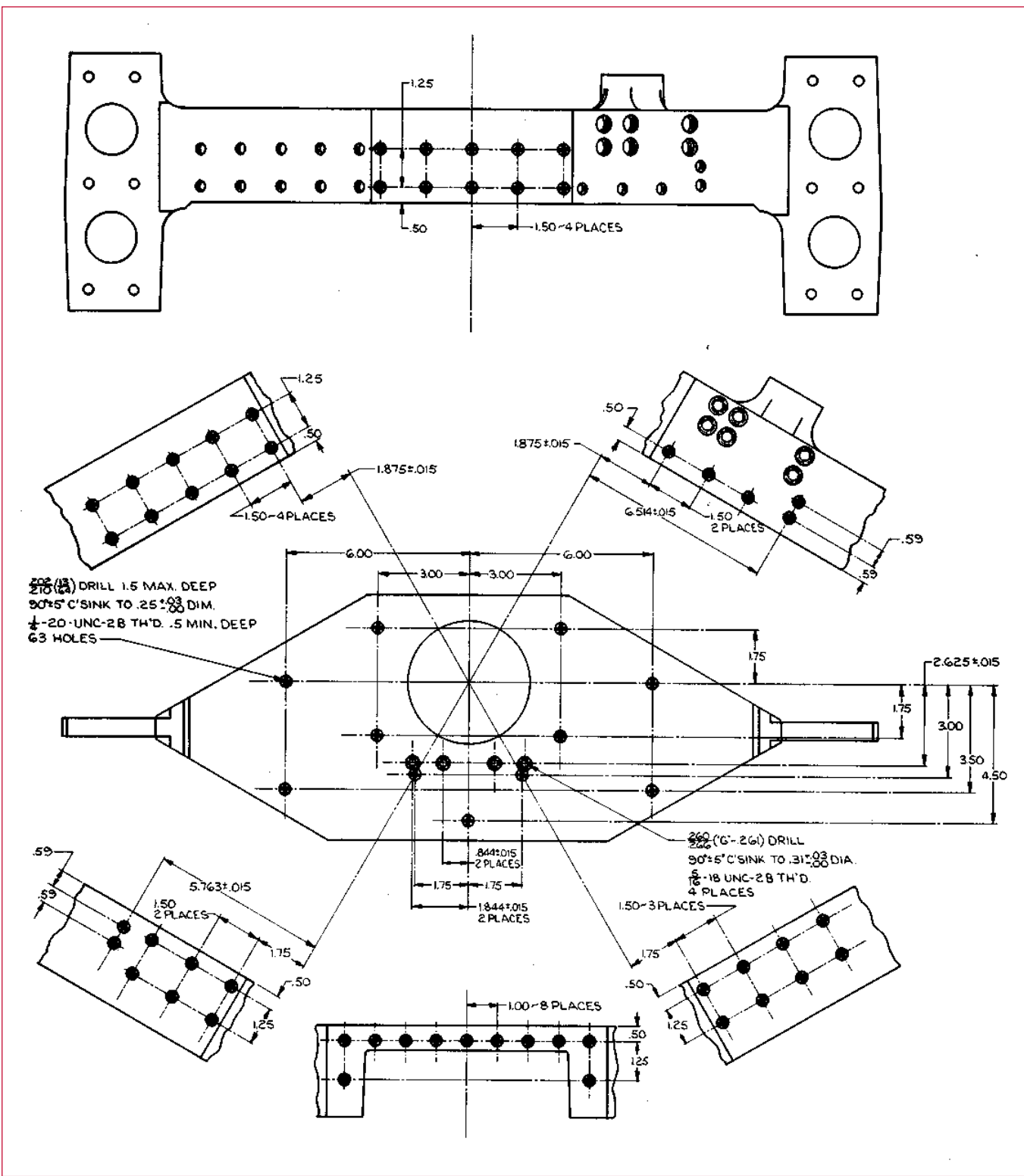
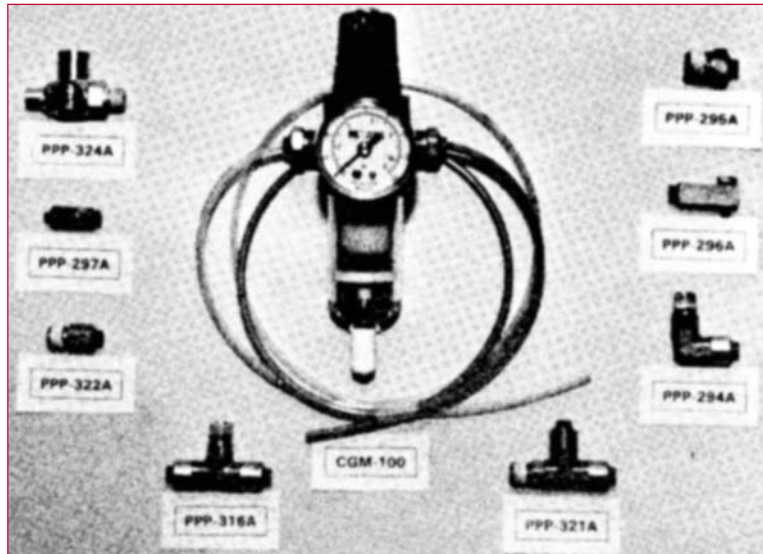


Figure A, Fixturing Dimensions



PARTS LIST

PART NUMBER	QTY. EACH	DESCRIPTION
CGM-100	1	... Fixturing Regulator
PPP-324A	1	... Flow Control Valve (1/8" NPT Elbow)
		Quick-Release Fittings for Use With 5/32" OD Tubing
PPP-297A	1	... #10-32 Straight Male Connector
PPP-322A	1	... 1/8" NPT Straight Male Connector
PPP-295A	1	... 1/4" NPT Straight Male Connector
PPP-296A	1	... #10-32 Male Swivel Elbow
PPP-294A	1	... 1/8" NPT Male Swivel Elbow
PPP-316A	1	... 1/8" NPT Male Branch Tee
PPP-321A	1	... 1/8" NPT Male Swivel Run Tee
78156A	1	... White; 5/32 OD Nylon Tubing (Order by the foot)
78158A	1	... Red; 5/32" OD Nylon Tubing (Order by the foot)
78159A	1	... Blue; 5/32" OD Nylon Tubing (Order by the foot)
78160A	1	... Yellow; 5/32" OD Nylon Tubing (Order by the foot)
78161A	1	... Orange; 5/32" OD Nylon Tubing (Order by the foot)
78662A	1	... Green; 5/32" OD Nylon Tubing (Order by the foot)

NOTES

data files

- 101 - Honing Bores With Keyways And Splines
- 102 - Honing Short Bores
- 103 - Honing Blind Holes
- 104 - Obtaining Specified Finishes By Honing
- 105 - Choosing the Right Stone
- 106 - Honing Tandem Holes
- 107 - Making Manual Honing Easier With Workholders
- 108 - Fixturing Parts For Power Stroking
- 109 - Vertical Hone Fixture
- 110 - Honing Small Bores
- 111 -
- 112 - External Honing
- 113 - Fixturing Design Considerations For Automatic Krossgrinding® Machines

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The fully equipped Automotive and Industrial Technical Service Centers in St. Louis is available to help with any honing problem at any time without cost or obligation. Sunnen factory-trained Field Service Engineers cover the entire country and are always at your service - again, no cost or obligation. Call us whenever you have a bore-sizing problem.

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